



Reusable vs. Single-Use Laryngoscopes in Anesthesia Practice

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In the past several decades, trends in the manufacturing of medical supplies in the United States have swung precipitously toward disposable or Single-Use (SU) devices. While our European colleagues use a breathing circuit for an entire day of cases, linens for draping, and clean laryngoscopes for reuse, we routinely use SU versions and throw everything away after each case. Disposable laryngoscopes increase cost, require large amounts of raw materials and energy for manufacturing, and generate a massive amount of waste without a demonstrated reduction in infection transmission compared to reusable laryngoscopes. In addition to cost and safety considerations, the environmental impact of the supply chain must also be scrutinized when changing or purchasing new equipment.

Spaulding Device Cleaning Classification is the standard reference for determining the level of cleaning required for reusable medical devices.

Level	Infection Risk	Description	Examples	Required Reprocessing Methods
Critical	High	Enter sterile areas, including the vascular system	Surgical instruments, implants	STERILIZATION High-pressure steam
Semi-critical	Moderate	Contact mucous membranes or broken skin	Laryngoscope blades , rigid/flexible endoscopes, video laryngoscope blades	HIGH-LEVEL DISINFECTION (HLD) Chemical reprocessing, vaporized hydrogen peroxide, glutaraldehyde, etc
Non-critical	Low	Contacts intact skin	Laryngoscope handles* , blood pressure cuffs, stethoscopes, video laryngoscope handles	LOW-LEVEL DISINFECTION (LLD) Wipe disinfection, Sani-cloths, 70% isopropyl alcohol, quaternary ammonium

*Controversy over laryngoscope handle cleaning: AANA and AORN designate handles as non-critical devices. The ASA doesn't delineate the laryngoscope blade and handle, and therefore, designates the entire device as a semi-critical device defaulting to HLD. The Society for Healthcare Epidemiology of America (SHEA) calls all parts semi-critical, needing HLD or sterilization or recommends SU devices over reusable. Some laryngoscope manufacturers have made handles compatible with HLD (not requiring disassembly, immersible) and list LLD options in the Instructions for Use. Studies have shown that following LLD, no pathogenic bacteria (VRE, MRSA, Gram-negative rods) or viral contamination was detected on the handles. Reusable handles treated with LLD or blades treated with HLD have not been shown to contribute to infection transmission.

Life Cycle Assessment (LCA):

Sometimes referred to as cradle-to-grave analysis, LCA is a methodology for assessing environmental impacts associated with all stages of a product's life, from raw material extraction through manufacture, distribution, use (reuse and maintenance), disposal and recycling (when applicable). LCA is specific to geographic regions as energy sources vary (i.e., electricity generated from coal vs. wind).

Sherman's LCA comparing SU and reusable laryngoscopes found:

Laryngoscope Environmental Impact - measured in equivalent CO₂ emissions (CO₂e)

- SU steel handle = **20x higher CO₂e than low-level disinfection of reusable steel handles** and **25x higher CO₂e than high level disinfection of reusable steel handles** (based on 4000 uses for reusable handles).
- SU steel blades = **7x higher CO₂e than high-level disinfection of reusable steel blades** and **2x higher CO₂e than sterilization of reusable steel blades**.

Laryngoscope Costs

- Reusable handles are more economical than SU handles if used **> 4-5 times** (even considering losses).
- Reusable blades are more economical than SU blades if used **> 5-7 times**.
- Extrapolated over 1 year (60,000 intubations), cost savings of using reusable laryngoscopes was \$675,000- \$869,000 at Yale Hospital.

References:

1. Sherman J. Reusable vs. disposable laryngoscopes. APSF Newsletter. Feb 2019;91.
2. Sherman JD and Hopf HW. Balancing infection control and environmental protection as a matter of patient safety: the case of Laryngoscope Handles. Anesth Analg. 2018; 127(2): 576-79.
3. Sherman JD, Raibley LA, Eckelman MJ. Life cycle assessment and costing methods for device procurement: comparing reusable and single-use laryngoscopes. Anesth Analg. 2018; 127(2): 434-43.
4. McGain F, Story D, Kayak E, et al. Workplace sustainability: The "cradle to grave" view of what we do. Anesth Analg. 2012;114(5):1134-9.
5. Call TR, Auerbach FJ, Riddell SW, et al. Nosocomial contamination of laryngoscope handles: challenging current guidelines. Anesth Analg. 2009;109:479-83.
6. Munoz-Price LS et al. SHEA Expert Guidance: Infection prevention in the operating room anesthesia work area. Infection Control & Hospital Epidemiology 2019;40:1-17.
7. Negri de Sousa AC, Levy CE, Freitas MIP. Laryngoscope blades and handles as sources of cross-infection: an integrative review. J Hosp Infect. 2013;83:269-75.
8. Egger Halbeis CB, Macario A, Brock-Utne JG. The reuse of anesthesia breathing systems: another difference of opinion and practice between the United States and Europe. J Clin Anesth. 2008; 20(2): 81-3.